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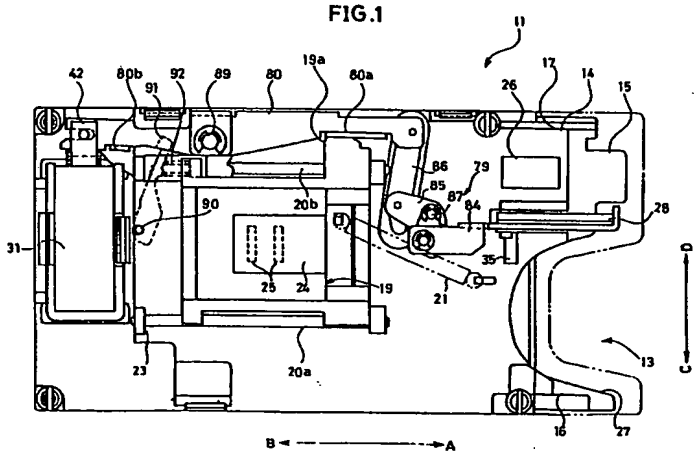
(54) Card reader having locking mechanism

(57) In the present invention, a slider (19) moves forward in response to an insertion of a card (12) into an inlet (13), and a shutter lever (28) is closed by a position regulation releasing operation of a shutter linked lever (80) related to the forward movement. Thus, the inserted card (12) is locked. IC data processing, for example, is carried out in this locked state. After the IC data are processed, the shutter lever (28) is opened by the driving means (31) to permit extraction of the card (12), and by the related movement of an engaging member (91), the shutter linked lever (80) is operated to realize open lock. Consequently, the inlet (13) is kept at the open state, ensuring extraction of the card (12).

FIG.1



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Description

The present invention relates to a card reader, and more specifically, to a card reader to which a card is manually inserted and extracted, having a card locking mechanism.

A composite type card reader to which IC cards and magnetic cards are both used has been known.

Generally, the composite card reader of this type has a slider in it, which slider moves forward and rearward in relation to the insertion/extraction of the card. By the sliding operation of this slider, an IC contact bush in the reader is brought into contact with the IC contact point of the card, and a magnetic head is brought into contact with the magnetic stripe, so as to process data.

As to the insertion/extraction of the card, when a customer manually inserts the card with the rear end portion of the card held by his hand for card transaction, a locking mechanism operates and locks the card. When the data processing is finished, a lock releasing mechanism operates to release the lock of the card.

However, sometimes the card happens to be erroneously extracted by a customer during processing of the data on the card, since the card locking mechanism with imperfect. Sometimes the card can not be extracted as the automatic locking cannot be released as the friction resistance in the engaging portion of the card reader is increased as the customer keeps holding the rear end of the card.

The reading from a magnetic card by a magnetic head can be carried out with smaller errors when reading is carried out during the extracting operation, due to the operational characteristics. Therefore, after the card is inserted, it is necessary to instruct extraction of the card to the customer, to carry out reading during extraction.

However, in the above mentioned system in which the inserted card is once automatically locked no matter whether it is an IC card or not, when a magnetic card is inserted, the locking must be released before extraction. Therefore, there is a loss of time generated by the locking and the lock releasing operation which prevents smooth and speedy processing of the card.

A lock releasing structure in which the card is pushed outward with force by a spring pressure in the reader when the lock is released, cannot be applied to a card reader in which the data is processed by the magnetic head during extraction of the card. A lock releasing mechanism preventing leaping out of the card may be employed. However, when the extracting operation of the card is delayed, the card is locked again and cannot be extracted. In view of the foregoing, an open state may be maintained or locked by keeping ON a lock releasing solenoid for a long period of time. However, in that case, the solenoid is damaged by heat. In addition, the magnetic head for reading or writing information from and to the card by scanning the magnetic track of the magnetic card inserted into the card reader must be adapted to respond to a deformation of the magnetic card, if any, so as to accurately scan the magnetic track.

The object of the present invention is to provide a card reader capable of surely and stably carrying out extraction of a card by maintaining a lock released state when card is extracted.

The invention solves the problem by a card reader as set forth in claim 1.

In the present invention, a slider moves forward in response to an insertion of a card into an inlet, and a shutter lever is closed by a position regulation releasing operation of a shutter linked lever related to the forward movement. Thus, the inserted card is locked. IC data processing, for example, is carried out in this locked state. After the IC data are processed, the shutter lever is opened by the driving means to permit extraction of the card, and by the related movement of an engaging member, the shutter linked lever is operated to realize open lock. Consequently, the inlet is kept at the open state, ensuring extraction of the card.

Consequently, when the card is extracted, the shutter lever is kept open, permitting extraction of the card. Therefore, even if the extracting operation of the card is delayed, the shutter lever is not locked again, ensuring extraction of the card.

The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

Fig. 1 is a plan view showing a standby state of a composite type card reader in accordance with the present invention;

Fig. 2 is a cross sectional view thereof;

Fig. 3 is a plan view of the composite type card reader shown in Fig. 1 in a card locked state; and

Fig. 4 is a plan view of the composite type card reader shown in Fig. 1 in a card lock released state.

In the embodiments, a composite card reader can handle IC cards, magnetic cards and cards having both functions of these cards. One of such cards is manually inserted into the composite card reader and the transaction data on the card are processed therein.

Referring to Figs. 1 and 2, the above mentioned composite card reader 11 has a card inlet 13 on a front surface through which a card 12 is inserted. A slider 19 sliding forward and rearward (directions shown by the arrows A and B) in response to inserting/extracting of the card 12 is provided in a card path 18 which is surrounded by an upper plate 14, a lower plate 15, a left plate 16 and a right plate 17 defining the card inlet.

The above mentioned slider 19 has both sides axially supported by slide axes 20a and 20b to be slidable in the direction of insertion/extraction of the card 12. Normally, the slider 19 is positioned on the side of the card

inlet 13 by means of a spring 21 (hereinafter this state is called a standby state).

A card receiving member 22 is provided projected to the card path 18 on an end portion on the B side of the slider 19. When a front edge of the card 12 inserted through the card inlet 13 meets with the card receiving member 22, the slider 19 slides to a position of a slider stopper surface 23 in the direction of the arrow B against the biasing force of the spring 21.

When the slider 19 moves forward to the stopper position, then a plurality of contact brushes 25 of a tilt lever 24 attached to the slider 19 are brought into contact with a plurality of IC contact points on the IC card. The IC data is processed in this state.

A magnetic stripe of a magnetic card inserted to the card path 18 is brought into contact with a magnetic head 26 arranged on an end portion on the A side of the card path 18. Consequently, magnetic data are processed.

An arc concave 27 is formed on the inlet 13 so as to accept fingers at the time of manual insertion/extraction, and a shutter lever 28 for permitting and forbidding insertion and extraction of the card 12 to the card inlet 13 is arranged on the card inlet 13.

When the data of the IC card are being processed, the shutter lever 28 is moved downward (card locked state), so as to prevent unexpected extraction of the IC card. When the data processing is completed, the lever is moved upward (locked released state), so as to permit extraction of the IC card. The opening/closing operations of the shutter lever 28 are carried out in relation to the ON-OFF operation of a lock releasing solenoid 31 through a linking mechanism 29 and a shutter opening lever 30, and to the ON-OFF operation of a locking solenoid 33 through the linking mechanism 29 and a shutter closing lever 32.

The shutter lever 28 has a shutter piece 34 bent downward on a tip end portion of the lever. The lever 28 is axially supported at the lower end portion on the B side by a support pin 35 horizontally positioned in the directions shown by the arrows C and D of the upper surface of the upper plate 14. The upper end portion on the B side of the lever 28 is coupled to a first link piece 36 of the linking mechanism. The shutter lever 28 is turned about the support pin 35 by moving forward and rearward the first link piece 36. Consequently, the shutter piece 34 is moved upward and downward. When the shutter piece 34 is moved upward, it opens the card inlet 13. When it is moved downward, it closes the card inlet 13.

A mechanism for maintaining the lock released state after the card lock is released will be described in the following.

Referring to Figs. 1 and 2, the shutter lever 28 has a shutter piece 34 bending downward on the chip end of the lever. The lever 28 is axially supported at the lower end portion on the B side by a pin 35 positioned horizontally in the directions shown by the arrows C and D on the upper surface of the upper plate 14. The upper end portion on the B side of the lever 28 is coupled to the first link piece 84 of a linking mechanism 79. The shutter lever 28 is turned with the pin 35, as the first link piece 84 is moved forward and rearward (directions shown by the arrows A and B). Consequently, the shutter piece 34 is moved upward and downward. When it is moved upward, the shutter piece 34 opens the card inlet 13. When it is moved downward, it closes the card inlet 13.

The above mentioned link mechanism 79 is consisted of continuously and pivotally attached first to third link pieces 84 to 86. More specifically, a front portion of the first link piece 84 is pivotally attached to the above mentioned shutter lever 28 and the rear portion thereof is pivotally attached to one end of the L-shaped second link piece 85. The other end of the second link piece 85 is pivotally attached to one end of the third link piece 86. The other end of the third link piece is pivotally attached to a shutter linked lever 80 which will be described later. The central portion of the L-shaped second link piece 85 is rotatably and axially supported on the upper plate 14 by means of a support pin 87. When the second link 85 is turned with the support pin 87 serving as the support point, the first link piece 84 is moved in response, and the shutter piece 34 of the shutter lever 28 is moved upward and downward.

A first position regulating piece 80a is provided projecting from an inner surface of an end portion on the A side of the shutter linked lever 80. In the normal standby state, when the slider 19 is at the standby position, the position regulating piece 80a is in contact with the initial position regulating piece 19a of the slider 19, regulating the shutter linked lever 80 at the initial position. When the slider 19 is moved forward, the position regulating piece 80a and the initial position regulating piece 19a are moved apart from each other to release the regulation of the position.

Normally, when the slider 19 is at the standby position, the position regulating lever 91 is being pulled to the side of the standby position (the direction shown by the arrow A) by means of the coil spring 92.

The coil spring 92 is pressed by the slider 19 when it is moved in the direction of the arrow B and biased to the side of the second position regulating piece 80b. In this biased state, the second position regulating piece 80b and the position regulating lever 91 are in disengaged state. When the card data processing is completed and the solenoid 31 is turned on to incline the shutter linked lever 80 to the open direction, the position regulating lever 91 is engaged with the second position regulating piece 80b in response to the movement of the lever 80 as shown in Fig. 3. Consequently, the open state is locked.

In this open lock state, at the start of the movement of the slider 19 in the direction of the arrow A, the initial position regulating piece 19a of the slider 19 meets with the first position regulating piece 80a of the shutter linked lever 80, with the open lock state of the position regulating lever 91 maintained. Therefore, the open lock state is maintained. Thereafter, as the slider 19 is moved in the direction of the arrow A, the open lock state on the side of the position regulating lever 91 is released.

In such a composite card reader 11 as described above, the first position regulating piece 80a is engaged with the initial position regulating piece 19a as shown in Fig. 1, and the shutter linked lever 80 is regulated to the initial standby position in parallel to the direction of insertion/extraction of the card. Consequently, the shutter piece 34 of the shutter lever is moved upward, and the card inlet 13 is kept at the open lock state.

When the customer inserts the card 12 into the card inlet 13 in this state, the front end of the card 12 reaches the card receiving member 22 projecting to the card path 18 of the slider 19. The slider 19 is moved forward (direction shown by the arrow B) against the biasing force of the spring 21, and it is pushed inward until it reaches the slider stopper surface 23 corresponding to the card processing position.

At this time, as shown in Fig. 3, the initial position regulating piece 19a of the slider is moved apart from the first position regulating piece 80a in response to the forward movement of the slider 19, so that the position regulation of the shutter linked lever 80 is released, the shutter lever 28 is moved downward by the weight of itself through the shutter linked lever 80 and the link mechanism 79, and the rear end of the inserted card 12 is locked by the shutter piece 34. Reading and writing of the card data are carried out in this locked state.

When reading and writing from and to the card 12 are completed, the solenoid 31 is temporarily turned on. In response to the turning on, the shutter piece 34 of the shutter lever 28 is moved upward through the shutter linked lever 80 and the link mechanism 79. When the solenoid 31 is turned on, the second position regulating piece 80b is engaged with the position regulating lever 91, and the shutter linked lever 80 is regulated to the initial position as shown in Fig. 4. Consequently, the card inlet 13 is open locked, permitting extraction of the card. When the card is extracted, the magnetic head is brought into contact with the magnetic head 26 so as to carry out processing of the magnetic data.

When the card 12 is extracted, the slider 19 is returned to the original standby position by the function of the spring 21. On this occasion, when the initial position regulating piece 19a of the slider and the first position regulating piece 80a are brought into contact with each other to realize open lock as shown in Fig. 1, then the engagement of the second position regulating piece 80b and the position regulating lever 91 is released from that time on, while the shutter linked lever 80 is regulated at the position as it is. Consequently, the shutter lever 28 is maintained at the elevated state, and the open lock state is maintained. In this manner, the card inlet 13 is maintained in an open state, ready for the next insertion of the card.

As described above, when the card is extracted, the shutter lever is open locked by the open locking operation of the shutter lever, and therefore, even if the extraction of the card is delayed, the shutter lever is not locked again, so the card can be surely extracted.

The release operation of the card lock by the shutter lever is carried out by temporarily turning on the solenoid when the lock is released. However, in the OFF state thereafter, the lock release state is maintained stably by the open lock structure.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

Claims

1. A card reader, comprising:

   a housing (14, 15, 16 and 17) having an inlet (13) through which a card (12) is inserted, for accepting the card (12) inserted through said inlet (13);

   a slider (19) provided in said housing (14, 15, 16 and 17) movable between a standby position and a position apart from said standby position in response to the card inserted/extracted through said inlet (13);

   shutter means which can be opened and closed for opening and closing said inlet (13) of said housing;

   a shutter linked lever (80) connected to said shutter means (28), said shutter linked lever (80) having its position regulated by said slider (19) to prevent closing of said shutter means (28) when said slider (19) is positioned at said standby position, its position released from regulation when said slider (19) moves from said standby position;

   means for closing said shutter means (28) in relation to the release of said position regulation of said shutter linked lever (80);

   driving means (31) for opening said shutter means (28) through said shutter linked lever (80); and

   an engaging member (91) provided engageable with said shutter linked lever (80) to prevent closing of said shutter means (28) when said shutter means (28) is opened by said driving means (31), said engaging member (91) engaging with said shutter linked lever (80) until said shutter linked lever (80) has its position regulated by said slider (19).

2. A card reader according to claim 1, wherein said engaging member (91) is moved apart from said shutter linked lever (80) when said slider (19) moves to said standby position.

3. A card reader according to claim 1 or 2, further comprising

   means (24, 25) to be electrically connected to an IC card, and

   a magnetic head (26) for reading data from a magnetic card.

FIG.1

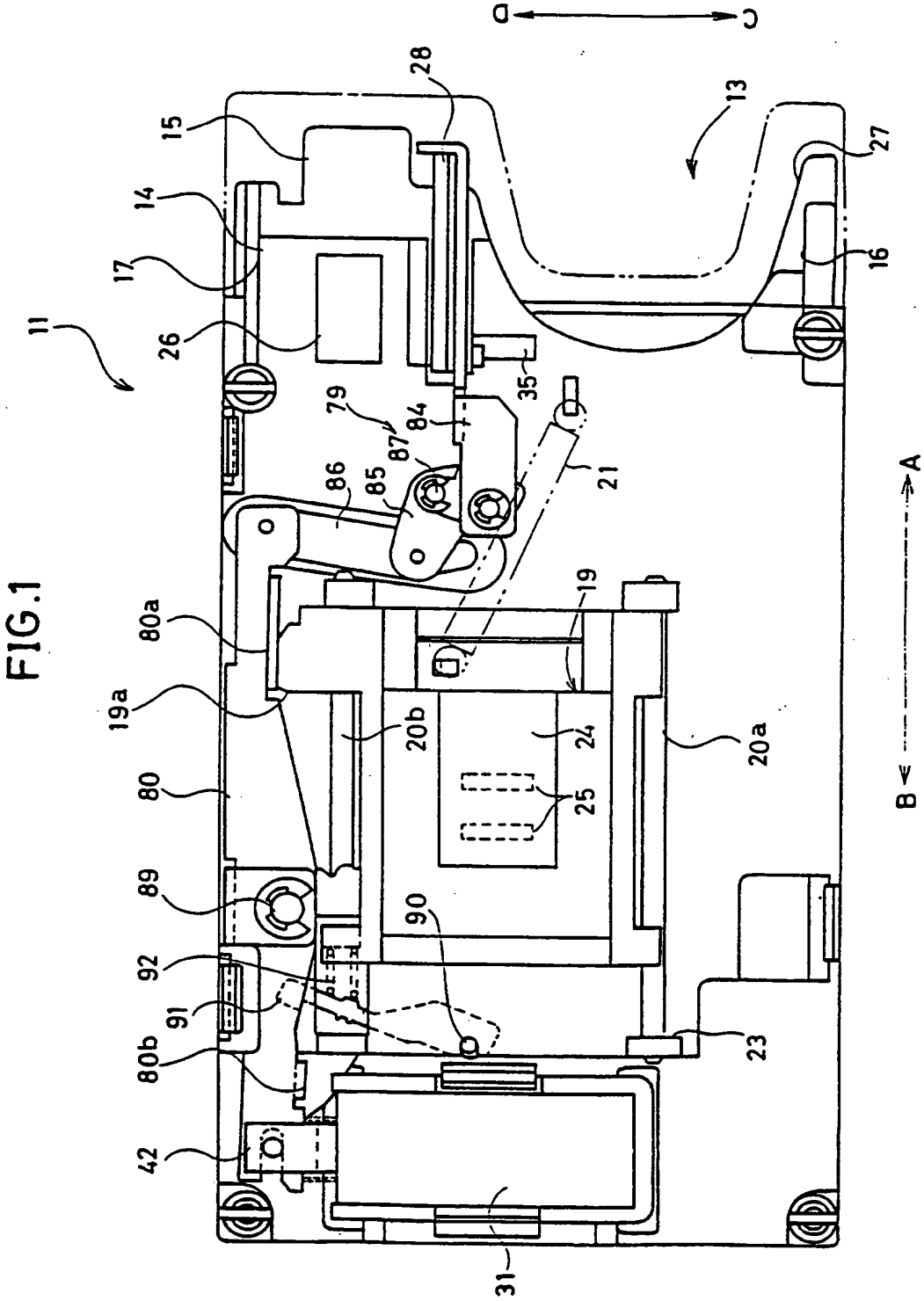
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FIG.2

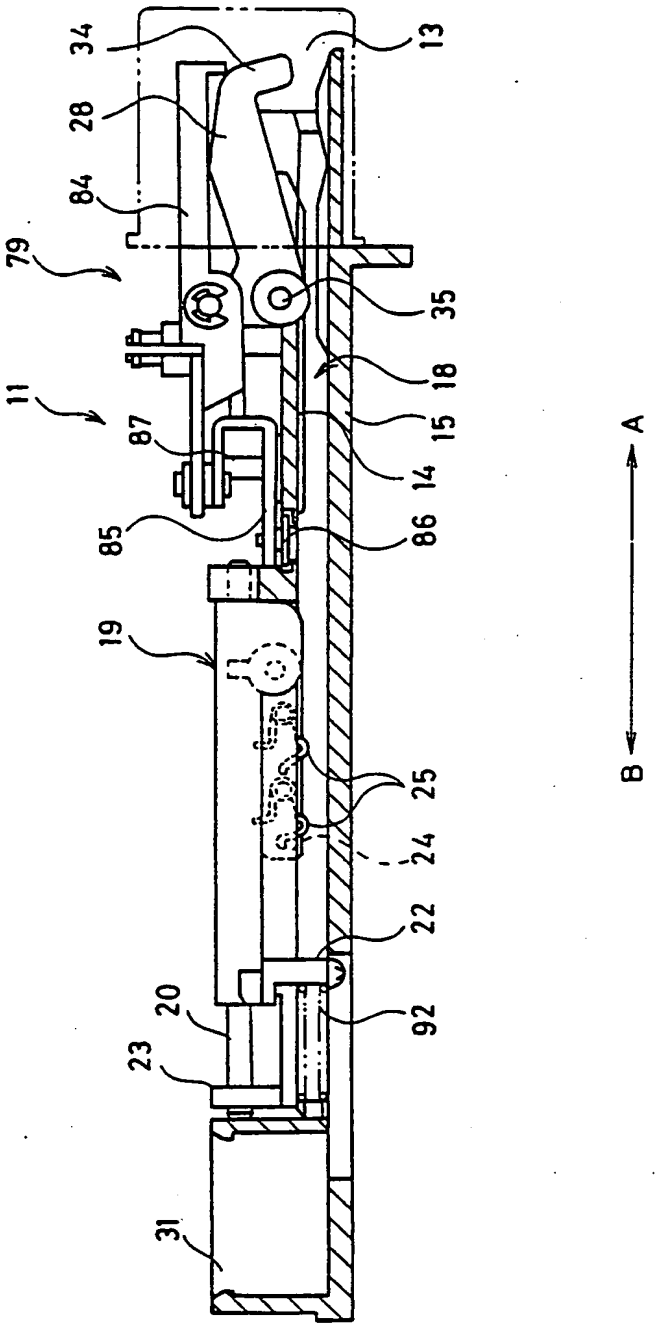

FIG.3

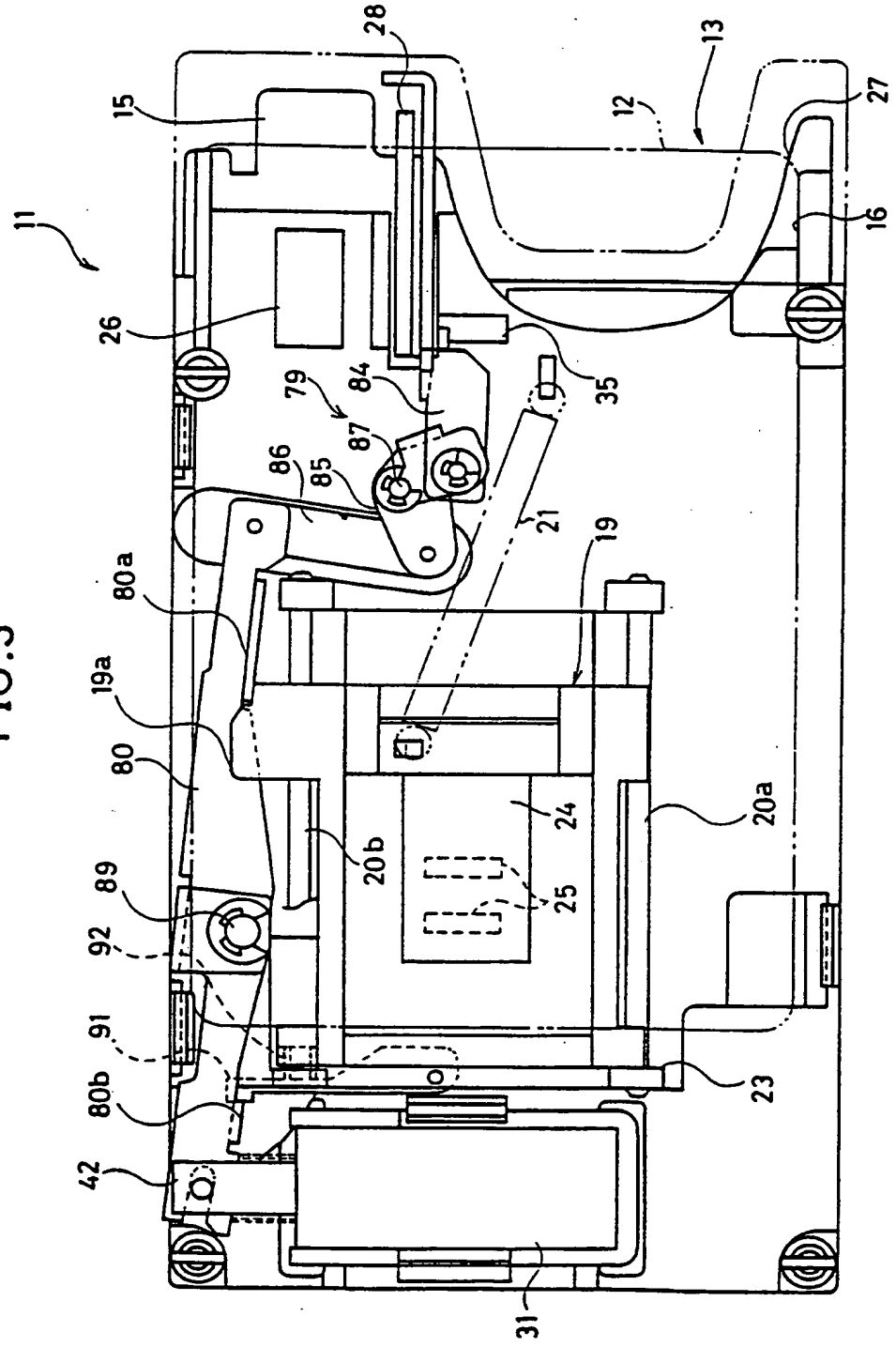
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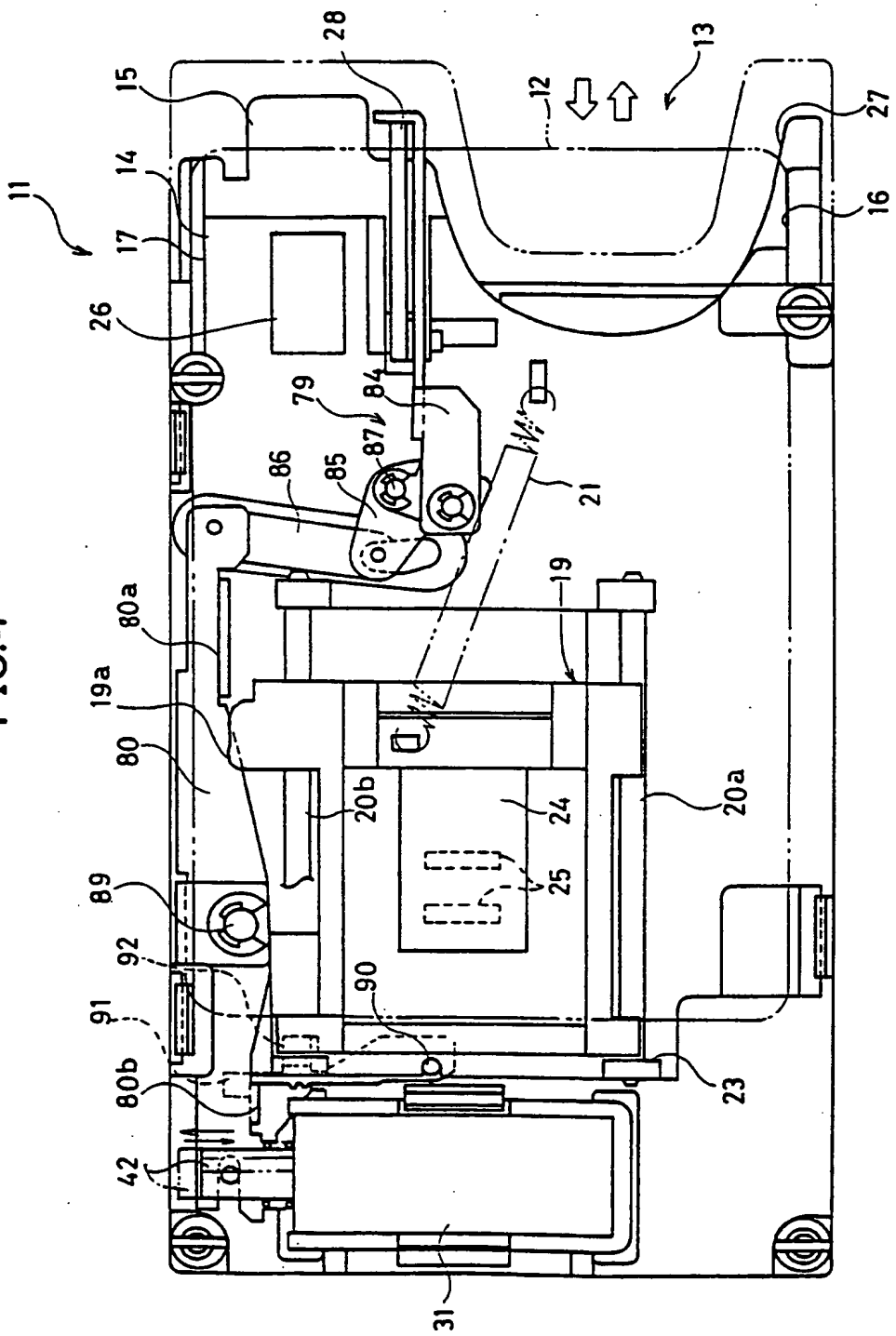
FIG.4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